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(72) Inventors RAYMOND JOHN THOMAS MORRIS, BRIAN ARTHUR WOODLEY and REGINALD ROYSTON STAPLETON

(19)

(54) A METHOD OF SEALING LEAKS IN PIPES AND VESSELS

(71) We, DUNLOP LIMITED, a British Company, of Dunlop House, Ryder Street, St. James's, London, S.W.1, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a method of sealing leaks in pipes, vessels and other carriers or containers of fluids.

According to the present invention a method of sealing leaks in pipes and other carriers or containers of fluids comprises applying to the material to be sealed a natural or synthetic rubber latex or dispersion which is either non-ionic or has an ionic charge which has the same sign as the sign on the material to which the latex or dispersion is applied.

Examples of suitable synthetic latices or dispersions which may be used are those based on polymers such as polyurethanes, polychloroprenes, styrene/butadiene rubbers, polyacrylonitrile rubbers, acrylic rubbers, poly-cis-isoprene and block copolymers containing butadiene, ethylene/vinyl acetate copolymers, acrylic copolymers, together with copolymers containing vinylidene chloride and emulsion ionizable polymers containing ethylene. Particularly preferred dispersions and latices are those which yield non-inflammable films on drying, for example polychloroprene. Preferably, the latex or dispersion is one which is capable of being cured without heating, but uncured latices may be used, as may prevulcanised latices.

It is also preferred that there should be present in the latex or dispersion, filler material to act as extender and stiffener. Examples of fillers which can be used are whiting, china clay, oil, pitch, wax, barytes, lithopone, short fibres such as fibre-glass or asbestos, or any other of the usual rubber fillers.

The dispersions or latices can also include antioxidants, cross-linking agents, stabilisers, thickeners, fungicides, thixotropic agents, bacteriostats, resin or other adhesion products for rubber latex.

The preferred stabiliser is casein, usually as ammonium caseinate, but other stabilisers including soaps of low foaming power, can also be used. Some or all of the stabilisers can, if desired, be employed in dispersing the fillers and the other materials included in the latex or dispersion. The polyacrylates such as ammonium polyacrylate are the preferred thickeners but any other of the known latex thickeners such as cellulose derivatives, for example methyl cellulose and gum tragacanth can be used.

Any of the known rubber antioxidants or, preferably, a mixture of such antioxidants can be used in preparing the composition of this invention. An example of a suitable antioxidant is Antioxidant 2246.

The latex or dispersion can be prepared in any type of internal mixer or blender so as to disperse all the solid components. Preferably, the total solids content of the latex or dispersion is between 10 per cent and 70 per cent by weight, preferably between 50 per cent and 70 per cent by weight.

When used in the sealing of underground pipes the latex or dispersion is preferably applied by using a "flood and drain" technique, and a particularly suitable method is as follows.

A latex or dispersion which cures at ambient temperatures is pumped into the pipe until it is as full as possible. By means of capillary action and hydrostatic pressure the latex or dispersion penetrates any gaps and any inefficient sealing material. If desired, pressure may be applied to the pipe using, for example, compressed air, in order to improve penetration. The excess liquid is then withdrawn from the pipe, e.g. by pumping, scraping, or a combination thereof. The latex or dispersion remaining in the pipe is then allowed to dry to form an elastic tough rubbery film.

If desired, the rate of drying of the latex or dispersion can be increased by passing through the pipe a flow of gas or air at low pressure, e.g. up to 10 psi. When an anionic latex or dispersion is used, the rate of drying may be

[*Price 25p*]

further increased by inducing coagulation, e.g. by the application of an acid gas.

The invention is illustrated by the following Example:—

EXAMPLE

An anionic latex having the following formulation was prepared:—

	Parts by Wt. Dry	Wet
polychloroprene latex[1]	100.0	166.7
sodium lauryl sulphate[2]	2.5	7.5
ethylene oxide fatty alcohol condensate[3]	0.5	3.3
caustic soda (25 per cent) solution	0.5	2.0
2,2′ - methylene - bis(4 - methyl - 6 - tertiary-butyl phenyl)[4]	1.0	3.3
zinc oxide (50 per cent dispersion)	15.0	30.0
sulphur (50 per cent dispersion)	2.5	5.0
thiocarbanilide[5]	1.0	3.0
filler[6] (60 per cent dispersion)	25.0	42.0
carbon black (50 per cent dispersion)	25.0	50.0
	173.0	312.8

[1]available commercially as Neoprene 650.
[2]available commercially as Empicol LZ. ("Empicol" is a Registered Trade Mark.)
[3]available commercially as Vulcastab LW. ("Vulcastab" is a Registered Trade Mark.)
[4]available commercially as Antioxidant 2246.
[5]available commercially as Stabiliser C.
[6]available commercially as Speswhite Clay.

The latex, which is anionic, had a solids content of 55.3 per cent and a viscosity such that it took 8 secs. for 50 ml to pass through $\frac{1}{8}$ inch viscometer jet.

The latex was then used to seal a section of pipe which included a 4-inch bell and spigot joint. The joint was packed with jute, which carries an anionic charge, and secured with retaining bolts.

The section was sealed with cap ends, filled with latex, and pressurised to 20 psi. The latex was then pumped out of the section and the section left to dry, leaving open a $\frac{1}{4}$ BSP vent.

The section was then air-pressurised at various pressures to test how effective the joint was. Initially, it was found that the joint was only able to withstand low pressure, i.e. 5—10 psi due to the fact that the latex was not completely dry. The latex was allowed to dry under a maintained pressure of 20 psi for about 2 days. Thereafter, when the section was pressured to 20 psi there was no measurable drop in pressure over a period of 3 days.

WHAT WE CLAIM IS:—

1. A method of sealing leaks in pipes and other carriers or containers of fluids, which comprises applying to the material to be sealed, a natural or synthetic rubber latex or dispersion, which is either non-ionic or has an ionic charge, which has the same sign as the sign on the material to which the latex or dispersion is applied.

2. A method according to claim 1 in which latex or dispersion is capable of being cured without heating.

3. A method according to claim 1 in which latex is non-curing or prevulcanised.

4. A method according to claim 1, 2 or 3 in which the latex or dispersion is based on polychloroprene rubber.

5. A method according to claim 1, 2 or 3 in which the latex or dispersion is based on a styrene/butadiene rubber

6. A method according to claim 1, 2 or 3 in which the latex or dispersion is based on a polyurethane, polyacrylonitrile or poly-cis-isoprene.

7. A method according to any of the preceding claims in which the latex or dispersion contains a filler.

8. A method according to claim 7 in which the filler is whiting, china clay, oil, pitch, wax, barytes or lithopone.

9. A method according to any of the preceding claims in which the total solids content of the latex or dispersion is between 10 per cent and 70 per cent by weight.

10. A method according to claim 9 in which the total solids content of the latex or dispersion is between 50 per cent and 70 per cent by weight.

11. A method of sealing leaks substantially

as herein described with reference to the Example.

12. A method of sealing leaks substantially as herein described.

R. I. G. McKAY,
Agent for the Applicants.

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